Childhood Influenza Vaccination Coverage in Kansas, an Analysis of BRFSS Surveys

2015 - 2016

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Background

The Behavioral Risk Factor Surveillance System (BRFSS) is the largest telephone survey in the world which collects data on risk behaviors, chronic health illnesses and use of preventative medical services of United States residents. The first BRFSS survey was conducted in Kansas in 1990 and has been conducted annually since 1992[1]. Traditionally a survey using landline telephones, BRFSS survey sampling methodology underwent a major change in 2011 to account for the increase in prevalence of cellular telephones. A dual frame sampling method was implemented that included a landline telephone and cellular telephone component[1]. The BRFSS survey conducted by all states consists of a core section and optional modules/state-added questions section. The core section of the survey is consistent across all states as this section includes questions set by the Centers for Disease Control and Prevention (CDC). The optional modules are selected by states from a bank of CDC-supported questions, or each state designs its own modules (state-added questions). Kansas BRFSS uses a split questionnaire design. All respondents are asked questions within the core section, and then the survey splits into two "branches," Part A or Part B, of optional modules/state-added modules for which each respondent is randomly assigned[1]. The survey assesses adults 18 years and older; however, respondents are randomly selected and also asked about the presence of children in his/her household. If there are one or more children under 18 years of age in the household, one child is randomly selected and the adult responds to questions regarding that child. Since 2011, questions were added to assess for influenza vaccination coverage in children 6 months to 17 years. In 2015, a question was added to assess for vaccine hesitancy reasons among parents who did not vaccinate their child. For a list of questions and years these questions were asked, refer to the appendix.

Each year influenza affects millions of children and those under five years of age are at higher risk of complications including hospitalization and death[3]. The Advisory Committee for Immunization Practices (ACIP) recommends all children over 6 months of age receive the seasonal influenza vaccine.

Methods

The study population was analyzed for BRFSS data collected in 2015 and 2016. Factors examined included parental race, insurance status, income, education level, socioeconomic status, number of children in the household, and child's ethnicity. Data was weighted using a raking method which enables increased representation in groups that would otherwise be underrepresented by reducing non-response bias and error within estimates. Respondents were given the option of 12 possible reasons for the child not receiving a flu vaccine; options were combined to enable analysis (Table 1). Chi-squared analysis was performed to determine if any of these variables were associated with vaccination coverage. Finally,

logistic regression and confounding analysis were performed to determine which factors had a measurable effect on vaccination coverage. Respondents were excluded from coverage and further analysis if parental respondent did not know child's vaccination status. BRFSS data was analyzed using SAS®.

Results

Vaccination Coverage

A fraction of the total respondents was included in the analysis, which varied by year (Table 1). Each year, a majority of the sample population was White, non-Hispanic, college educated, earned $50,000 or more per year, had medical insurance and lived in an urban county (≥150 persons per square mile).

Table 1: Study population demographics by year, Kansas

BRFSS Year	Total Respondents	Included in Analysis	White	Non-Hispanic	College Educated	Annual Income ≥$50k	Insured	Urban County Resident
2015	23,236	2,241	86.7%	80.9%	65.9%	51.2%	82.9%	55.1%
2016	12,188	1,146	86.4%	85.0%	65.5%	50.7%	83.0%	57.6%

Of the 1,090 respondents who knew their child's influenza immunization status in 2016, 53.33% (566) received the flu vaccine within the past 12 months; a 6.34% change over the previous year (Table 2). Despite slight increases and decreases, the childhood influenza immunization rate has remained statistically unchanged from 2012 to 2016 and continued to be well below the national Healthy People 2020 (HP2020) goal of 80% (Figure 1). Further analysis of 2016 data revealed that a child whose parent did not receive a seasonal flu vaccine was 87% less likely to receive a flu vaccine compared to children whose parents were immunized. (Table 3). Additionally, children who lived in urban counties had significantly higher odds of receiving the flu vaccine compared to those who lived in rural counties. No other factors were statistically associated with receipt of the flu vaccine.

Table 2: Influenza immunization coverage among children by year, Kansas

BRFSS Year	Question	n	%	% Change from Previous Year	95% Confidence Interval
2015	**Received a flu shot within the past 12 months** (n=2,110)	1,058	50.15		47.63 – 52.67
2016	**Received a flu shot within the past 12 months** (n=1,090)	566	53.33	+6.34	49.73 – 56.93

Figure 1: Childhood influenza vaccine coverage among children by year, Kansas

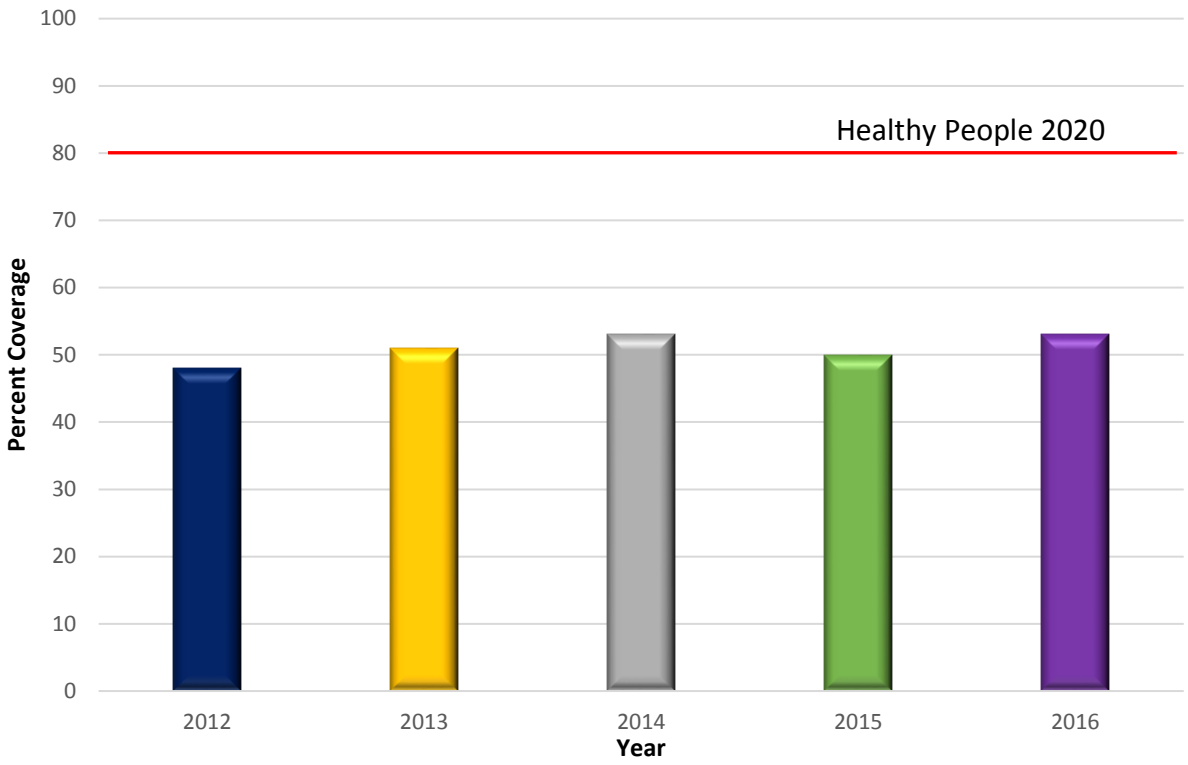

Table 3: Factors statistically associated with influenza vaccine coverage among children by year, Kansas

BRFSS Year	Factor	Odds Ratio	95% Confidence Interval
2015	**Parent received flu shot within past 12 months** (No vs. Yes)	0.15	0.14 – 0.15
	County of residence (Urban vs. Rural)	1.56	1.52 – 1.60
2016	**Parent received flu shot within past 12 months*** (No vs. Yes)	0.18	0.13 – 0.23
	County of residence* (Urban vs. Rural)	1.49	1.06 – 2.11

**Adjusted for income*

Vaccine hesitancy

Influenza vaccine hesitancy was assessed among respondents that stated his/her child did not receive a flu vaccine within the past 12 months; participants were asked to provide a reason (Table 4).

2015: The most common reason given was respondent felt their child didn't need the vaccine (34.67%). An additional 14.1% indicated they did not vaccinate their child due to beliefs of lack of vaccine efficacy or perceived side effects.

2016: Unchanged from previous year's analysis, the most common reason a child did not receive the flu

vaccine was parent respondent felt the child did not need it (32.66%). However, an increase in the percentage of parents which stated they did not believe/approve or were against flu shots for their children increased from 3.16% to 9.08%.

Table 4: Top three reasons for childhood influenza vaccine hesitancy by year, Kansas

BRFSS Year	Reason for vaccine hesitancy	n	%
2015 (n=1,050)	Child does not need it	356	34.67
	Don't know / Not sure	102	8.42
	Vaccine does not work	66	7.11
2016 (n=523)	Child does not need it	162	32.66
	Don't know / Not sure	68	12.46
	Parent does not believe/approve or is against flu shots	47	9.08

Discussion

Data from BRFSS studies revealed childhood influenza immunization coverage in Kansas has remained at approximately 50% annually from 2012 to 2016; well below HP2020 goal of 80% coverage, yet only slightly below the national average of 59.3%[4]. The main reason identified for parents not vaccinating their children from influenza annually was the feeling their child did not need it; indicating the perceived dangers and complications from influenza infection are minimized among these respondents. This observation coupled with recent CDC data regarding an increase in pediatric deaths due to influenza, over 80% of which were not vaccinated, highlight the need to increase parental education on the effects of influenza and doctor recommendations for annual immunization[5].

Factors significantly associated with vaccination provide a guide to develop intervention programs and identify barriers to vaccination. It was observed that if a parent did not receive his/her influenza vaccination, their child had an 87% reduced chance of receiving one; therefore, targeting parental vaccination could be effective at increasing childhood influenza immunization coverage. Additionally, those who receive the influenza vaccine themselves likely do not hold reservations regarding vaccine safety and efficacy so parental acceptance of the influenza vaccine plays an important role in vaccinating children.

Limitations:

One limitation to this analysis included that responses of unknown vaccination status for the child (3.9%) were removed causing a possible underrepresentation of true coverage levels. However, coverage reported using this method still closely mirrors those found in other studies, including the National Immunization Survey – Flu (NIS-Flu). Additionally, BRFSS data is self-reported and not validated being subject to recall bias. Lastly, this study does not include persons without land-line or cellular telephones.

Phone ownership is highly correlated to income, so lower income persons may be underrepresented in this study.

Strengths:

The standardized methodology and consistency BRFSS provides allowed for reliable results which can be generalized to all Kansas children. Additionally, unlike other studies, BRFSS respondents provide socioeconomic information which allowed for analysis into the effects of these factors on vaccination. Respondents were randomly selected, eliminating selection bias. Lastly, the large sample size enabled for a more in-depth analysis to be performed while maintaining results that are representative of Kansas.

References

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Appendix: Child Influenza Immunization BRFSS Questions – 2012-2016

If selected child's age is 6 months or greater, continue. Otherwise go to next module.

1. During the past 12 months has [he/she] had a seasonal flu vaccination? There are two types of flu vaccinations. One is a shot and the other is a spray in the nose.

Yes	
No	**[Go to question 3]**
Don't know / Not sure	**[Go to next module]**
Refused	**[Go to next module]**

2. During what month and year did [he/she] receive his/her most recent seasonal flu vaccination? The seasonal flu vaccination may have either been the flu shot or the flu spray. The flu spray is the flu vaccination that is sprayed in the nose.

Month / Year	**[Go to next module]**
Don't know / Not sure	**[Go to next module]**
Refused	**[Go to next module]**

Options for 2015

3. What is the MAIN reason [he/she] has not received the flu vaccination for this current flu season?

Do not read answer choices below. Select category that best matches response.

Child does not need it
Doctor did not recommend it
Did not know that child should be vaccinated
Flu is not that serious
Child had the flu already this season
Side effects / can cause flu
Does not work
Plan to get child vaccinated later this flu season
Flu vaccination costs too much
Inconvenient to get vaccinated
Saving vaccine for people who need it more
Tried to find vaccine, but could not get it
Not eligible to receive vaccine
Other (specify) _____
Have not got around to it / didn't get it
Parent does not believe / approve, is against flu shots
Age is too young
Decision left to child who refused
Do not trust vaccine
Child has needle phobia / anxiety
Unsure if child has been given shot
Not parent, it is up to them
Don't know / Not sure (Probe: "What was the main reason?")
Refused

Options for 2016

3. What is the MAIN reason [he/she] has not received the flu vaccination for this current flu season?

Do not read answer choices below. Select category that best matches response.

Child does not need it
Doctor did not recommend it
Did not know that child should be vaccinated
Flu is not that serious
Child had the flu already this season
Side effects / can cause flu
Does not work
Plan to get child vaccinated later this flu season
Flu vaccination costs too much
Inconvenient to get vaccinated
Saving vaccine for people who need it more
Tried to find vaccine, but could not get it
Not eligible to receive vaccine
Other (specify) _____
Have not got around to it / didn't get it
Parent does not believe / approve, is against flu shots
Age is too young
Decision left to child who refused
Don't know / Not sure (Probe: "What was the main reason?")
Refused